AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (currently amended) A valve mechanism for controlling the flow of fluid therethrough, ~~which~~ the mechanism ~~comprises~~ comprising a plunger ~~member~~ , wherein at least part of ~~which~~ the plunger is journalled for axial reciprocation between a rest position and an operative position within an electric coil under the influence of a magnetic field generated by that coil when an electric current passes through the coil, the distal end of the plunger extending into a valve head chamber having an ~~outlet~~ nozzle bore in fluid flow communication with a nozzle ~~outlet~~ orifice, the reciprocation of the plunger being adapted to open or close a fluid flow path from the valve head chamber through that bore, characterized in that:

the plunger is of a unitary construction and is made from an electromagnetically soft material having a saturation flux density greater than 1.4 Tesla; and

the plunger has a diameter of 3 mms or less and a length to diameter ratio of less than 15:1.

2. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the plunger is made from a material having a saturation flux density greater than 1.5 Tesla.

3. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the plunger is made from a material having a saturation flux density of from substantially 1.6 to substantially 2.2 Tesla.

4. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the plunger has a diameter of less than 2.5 mms and a length of from 10 to 20 mms.

5. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the plunger has a diameter of less than 1 mm and a length to diameter ratio of from 5:1 to 10:1.

6. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the material from which the plunger is made has a coercivity of less than 100 amperes per meter.

7. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the material from which the plunger is made has a coercivity of less than less than 50 amperes per meter.

8. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the material from which the plunger is made has a relative magnetic permeability in excess of 10,000.

9. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the material from which the plunger is made has a relative magnetic permeability in excess of 50,000.

10. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the nozzle bore leading from the valve head chamber to the nozzle orifice has a length to diameter ratio of less than 8:1.

11. (previously presented) A valve mechanism as claimed in claim 1, characterized in that the nozzle bore leading from the valve head chamber to the nozzle orifice has a length to diameter ratio of from 1.5:1 to 5:1.

12. (currently amended) A valve mechanism for controlling the flow of fluid therethrough, ~~which~~ the mechanism ~~comprises~~ comprising a plunger ~~member~~ , wherein at least part of ~~which~~ the plunger is journalled for axial reciprocation between a rest position and an operative position within an electric coil under the influence of a magnetic field generated by that coil when an electric current passes through the coil, the distal end of the plunger extending into a valve head chamber having an ~~outlet~~ nozzle bore in fluid flow communication with a nozzle ~~outlet~~ orifice, the reciprocation of the plunger being adapted to open or close a fluid flow path from the valve head chamber to that nozzle orifice through that bore, characterized in that:

the plunger is of a unitary construction and is made from an electromagnetically soft material having a saturation flux density greater than 1.4 Teslar, a coercivity of less than 25 ampere per meter, and a relative magnetic permeability in excess of 10,000; and

the plunger has a diameter of less than 2.5 mms and has a length to diameter ratio of from 3:1 to 10:1; and

the nozzle bore leading from the valve head chamber to the nozzle orifice has a length to diameter ratio of less than 8:1, and the nozzle orifice has a diameter substantially the same as that of the bore.

13. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the bore has a diameter of from 20 to 400 micrometers and a bore length to diameter ratio of from 1.5:1 to 8:1.

14. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the plunger has an internal axial bore or cavity formed in the distal end thereof, said bore or cavity extending axially within the plunger proximally no further than that point at which the plunger enters the coil when the plunger is fully retracted into the coil.

15. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the nozzle orifice is one of a plurality formed in a nozzle plate carrying an array of [[a]] the plurality of valves mounted thereon, each nozzle orifice being in register with the plunger of a valve mechanism.

16. (previously presented) An array of valve mechanisms as claimed in claim 15, characterized in that the nozzle bore and the nozzle orifice are formed as a single component with the nozzle plate.

17. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the coil is wound or formed directly upon a tubular support member within which the plunger is to move.

18. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the distal wall of the valve head chamber carries one or more upstanding areas to provide an enhanced seal between the opposed end faces of the plunger and the distal wall.

19. (previously presented) A valve mechanism as claimed in claim 18, characterized in that the sealing areas are provided by one or more upstanding ribs substantially concentric with the inlet to the nozzle bore.

20. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the coil is a single winding upon a tubular support member.

21. (previously presented) A valve mechanism as claimed in claim 12, characterized in that a metal container is provided as a magnetic return path to the coil.

22. (previously presented) An array of valve mechanisms as claimed in claim 16, characterized in that a metal container is provided around each coil to act as a magnetic screen between adjacent valve mechanisms in the array.

23. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the plunger is journalled within a tubular support member for the coil and the plunger and the tubular support member do not have congruent cross sections, whereby axial fluid flow paths are formed between the tubular member and the plunger.

24. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the conductor of the coil is deposited, wound or otherwise formed directly upon or within the wall of a tubular support member which provides the interface between the conductor of the coil and the plunger which is journalled in direct sliding engagement within the support member.

25. (previously presented) A valve mechanism as claimed in claim 12, characterized in that the nozzle bore has a length to diameter ratio of from 1:1 to 5:1 and a nozzle orifice diameter of from 20 to 400 micrometers.

26. (canceled)

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41. (canceled)

42. (canceled)

43. (canceled)

44. (canceled)

45. (currently amended) A valve mechanism for controlling the flow of fluid therethrough and a drop on demand ink jet printer incorporating ~~such a~~ with the valve mechanism, ~~which~~ the mechanism ~~comprises~~ comprising a plunger ~~member~~ , wherein at least part of ~~which~~ the plunger is journalled for axial reciprocation between a rest position and an operative position within an electric coil under the influence of a magnetic field generated by that coil when an electric current passes through the coil, the distal end of the plunger extending into a valve head chamber having an ~~outlet~~ nozzle bore in fluid flow communication with a nozzle ~~outlet~~ orifice, the reciprocation of the plunger being adapted to open or close a fluid flow path from the valve head chamber through that bore, characterized in that:

at least a major portion of the plunger is made from an electromagnetically soft material having a saturation flux density greater than 1.6 Tesla; and

the plunger has a diameter of 3 mms or less and a length to diameter ratio of less than 15:1.